NUMERICAL OPTIMISATION
ASSIGNMENT 0: EXAMPLE

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EXERCISE 1.

(a) Write a Matlab function that implements the Rosenbrock function

$$f(x, y) = 100(y - x^2)^2 + (1 - x)^2.$$

Be careful to implement a function that can be evaluated at many points simultaneously.
Submit your implementation via `Cody Coursework`.

(b) Create a two dimensional grid using Matlab's command `meshgrid`. Plot f using your implemented Matlab's function on the grid. Check out the following functions: `surf` (use option 'EdgeColor' = 'none' when using many grid points), `surfc`, `contour`, `contourf`. Can you see the minimiser? Can you use some transformation to highlight the minimiser?
Submit your solution via `Turnitin`.

(c) Calculate the gradient ∇f and the Hessian $\nabla^2 f$.
Submit your solution via `Turnitin`.

(d) Find the minimiser x^* of the function f. Show that x^* is unique and that $\nabla^2 f(x^*)$ is positive definite.
Submit your solution via `Turnitin`.

(e) Compute the gradient ∇f and the Hessian $\nabla^2 f$ numerically using finite differences. Check out the functions `gradient`, `diff`, and implement finite differences as a matrix multiplication.
Submit your solution via `Turnitin`.

Remark. The submission to `Turnitin` should not be longer than 2 pages. Avoid submitting more code than needed (if any) and focus on explaining your results.